

Alternative fuel use can reduce the consumption of diesel fuel and lower emissions of greenhouse gases and various air pollutants. One fuel alternative, B20 biodiesel could save more than 1,100 gallons of fuel, eliminating 12 tons of carbon dioxide per truck each year and reducing sulphur dioxide emissions by 3-11%.

What is the challenge?

Emissions generated through the daily convergence of diesel trucks on port facilities can undermine local air quality.

These trucks emit substantially more particulate matter (PM), volatile organic compounds (VOCs), nitrogen oxide (NO_x), carbon monoxide (CO) and carbon dioxide (CO₂) per mile than light-duty vehicles. While trucks are critical to local and national economies, they can have costly health impacts in the communities they travel through. Emissions from diesel trucks have improved with cleaner engine and after treatment technologies, but the challenge to minimize pollution per trip remains for drayage trucks that typically predate newer control technologies.

What is the solution?

Alternatives to conventional diesel fuel can reduce the air quality impacts of freight. Drayage fleets can be suited to alternative fuel use due to frequent travel to port and warehouse facilities where refueling stations could be located. The higher cost of these fuels can sometimes be offset by government grants. Options for heavy-duty on-road applications include:

Biodiesel

Biodiesel is a renewable alternative to petroleum diesel that can be refined from a variety of animal fats and vegetable oils. It is an attractive option because at lower percentage blends

biodiesel can run in unmodified diesel engines, and is compatible with many emission control devices. Potential sulfur dioxide (SO₂) and CO₂ reductions can be significant depending on the percentage of biodiesel used. B20, a common biodiesel blend, contains a mixture of 20% biodiesel and 80% petroleum diesel. Most major engine companies recognize the use of blends up to B20 as compatible with engine warranties.

Diesel Emulsion

Diesel/water emulsions combine 80% diesel fuel with water and additives. This can reduce nitrogen oxide and particulate matter emissions by altering combustion temperatures and patterns to more completely burn the fuel. Emulsions do not require vehicle modifications and can be used in with many after-treatment technologies. Emulsions can be easily applied to centrally fueled fleets.

Ultra-low Sulfur Diesel (ULSD)

ULSD has been refined to have a lower sulfur content than conventional diesel and can be used in any on-road diesel engine applications. Today, diesel fuel has a maximum sulfur content of 500 parts per million (ppm) while USLD ranges from 15 to 30 ppm of sulfur. EPA has mandated the use of USLD in all on-road diesel engines by 2006.

The results are in . . .

Each alternative fuel option has different

advantages for use in drayage applications.

- Biodiesel can reduce lifecycle greenhouse gas emissions over conventional diesel 10-20% for B20 and 40-90% for B100. carbon monoxide, particulate matter, volatile organic compounds and sulphur dioxide reductions can range from 3-11% for B20, with a potential increase in NO_x emissions.
- Purinox diesel/water emulsion produced by Lubrizol Corp. has been verified by the California Air Resources Board (CARB) to reduce NO_x and PM emissions. Estimates include a PM reduction of 50% and 15% for NO_x. However, such emulsions can result in fuel economy losses of 15% and up to a 20% reduction in engine power.
- In addition to reducing the maximum sulfur content of diesel by 97%, ULSD provides the greatest emissions benefits when used with emission control devices. ULSD enables the effective use of particulate traps and catalytic converters resulting in reductions of PM, VOC and CO by as much as 90%.

Next steps

Ports and nearby communities can act as a central point for the refueling of alternative fueled trucks, and support the development of refueling stations. Information on heavy-duty applications for alternative fuels and diesel fuel regulatory programs can be found through the EPA's National Clean Diesel Campaign (www.epa.gov/cleandiesel) and the Alternative Fuel Data Center (www.eere.energy.gov/afdc/).